

## HOW RAINFALL DATA MAY BE USED FOR DETERMINING ROAD CONDITIONS.

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[Author's Abstract.]

Realizing the need for up-to-date, complete, and accurate information on highway conditions, an effort has been made to determine the effects of rainfall on highways so that telegraphic reports of rainfall can be utilized in making up the daily highway weather service bulletin. The following results were obtained after a study of replies to questionnaires mailed to cooperative observers, crop correspondents, meteorologists, engineers, and others familiar with highways and weather conditions in the communities in which they live. The results apply to dirt roads in Arkansas and mainly to spring, late autumn, and early winter conditions.

It should be remembered that all the results are averages, and that only reliable estimates in measureable amounts of precipitation were used to obtain the figures. The average opinion of the correspondents is that 1.38 inches of rainfall make dirt roads muddy; those located in the lowlands estimated that 1.13 inches was the required amount; in the uplands, 1.51 inches. They estimated that 2.78 inches of rainfall make dirt roads very muddy; those in the lowlands, 2.25 inches; and those in the uplands or hills, 2.90 inches. The variation for surface conditions is 29 per cent in both instances. It is interesting to note that it requires about twice as much rainfall to make dirt roads very muddy as to make them muddy. The estimated amount required to make dirt roads impassable averaged 4.04 inches, varying from 3.57 inches for the lowlands to 4.35 inches for the hills and uplands. Here the variation is 22 per cent for surface conditions. By impassable is meant that automotive and the heavier horse-drawn vehicles can not get through, but the lighter horse-drawn vehicles usually can. Many of the correspondents reported that their highways seldom became impassable on account of mud, therefore these figures apply only to highways that do.

The estimated length of period with intermittent light-to-moderate rains and cloudy weather that make dirt roads muddy was 2.6 days; very muddy, 5 days; impassable, 6.5 days. These figures may be used in counting accumulated amounts of rainfall when sufficient precipitation to produce conditions to be reported does not occur in a shorter time. There was not much variation

in length of period for surface conditions, except that the time necessary to produce impassable conditions was a little longer for the bottoms. Here the accumulated amounts are more effective in producing results on account of soil and drainage and one more day's rainfall may be used in counting the total. The time required for roads to become passable after the cause of impassability ceases was estimated at about a week, being a little longer in the bottoms.

These results can be used to determine the conditions of highways from telegraphic reports of rainfall when mail reports are missing or incomplete. If the mail report indicates a fair condition of roads and 1.13 inches of rain fell over the district according to the telegraphic reports since mailing the card, the roads should be reported "muddy." If the roads were muddy and 1.12 inches (2.25 inches minus 1.13 inches) were telegraphed since the card report, the report should be "very muddy." If the roads were very muddy and 1.32 inches (3.57 inches minus 2.25 inches) were telegraphed since the card report, they should be reported "impassable." Lowland figures are used in the above illustration. A plan like this is needed more in the winter time than at other seasons because roads are muddy or very muddy much of the time and small amounts of precipitation make important changes in highway conditions. Snowfall is seldom a factor in road conditions in Arkansas except when melted.

## EXTRAORDINARILY HIGH BAROMETER READINGS IN BERING SEA, JANUARY 17, 1920.

Capt. Arthur H. Mellick, of the United States fisheries ship *Eider*, has submitted the following note, which is interesting in connection with the abnormally high pressure prevailing over Alaska and the Aleutian Islands and the unusually low pressure (barometer 29.64 inches Jan. 17) at Honolulu during January (see p. 45, below):

On the 15th day of January we left Unalaska for the Pribiloff Islands. The barometer then registered 30.62. By midnight it was 30.66 [inches]. On the 16th at midnight it showed 31.00. At noon on the 17th it showed 31.20, at 4.00 p. m. it was above the registered marks, and at midnight it was back to 31.20, where it remained until 4.00 a. m. on the 19th, when it commenced to fall very slowly; and even now, with a northeast gale blowing and heavy snowstorm, it is still 30.68. Such barometer readings I have never seen in this part of Alaska before with all the years that I have been in the country. While at the Pribiloff Islands the sea was very calm and light northeast breeze, but not a particle of ice was to be seen, although it felt as though it was not very far away.